

AMENDMENTS TO THE CLAIMS

Claims 1-31 are canceled.

32. (New) A microfluidic system comprising a microchannel and a pump arranged to cause fluid in said microchannel to flow under the action of secondary electroosmosis.

33. (New) The system as claimed in claim 32 wherein the pump comprises at least one electrically conductive member disposed in said microchannel and having a surface the normal whereto has a component parallel to and a component perpendicular to the flow direction in said microchannel, and electrodes positioned on either side of said member, in said flow direction whereby to apply an electric field (E) to said member such as to cause fluid in said microchannel to flow under the action of secondary electroosmosis.

34. (New) The system as claimed in claim 33, wherein the system is a fluid network formed in a substrate, the at least one electrically conductive member being disposed in a segment of said microchannel and the electrodes being positioned to apply an electric field across the segment, and wherein the space between the electrically conductive member and the walls of the microchannel, and between different electrically conductive members, is between $0 a_{char}$ and $2 a_{char}$, the surface of the at least one electrically conductive member being smooth such that the surface irregularities are less than 5% of d_{char} .

35. (New) The system as claimed in claim 34, wherein the space between the electrically conducting member and the channel walls, and between different electrically conducting members, is between $1/8 a_{\text{char}}$ and $1/2 a_{\text{char}}$, and wherein the surface irregularities are less than 1% of d_{char} .

36. (New) The system as claimed in claim 34, wherein the at least one electrically conducting member the shape of an ellipsoid, sphere, cylinder, elliptical cylinder or pone.

37. (New) The system as claimed in claim 34, wherein the at least one electrically conducting member consists of a small cylinder with the longitudinal axis normal with respect to the fluid flow direction.

38. (New) The system as claimed in claim 34, wherein the at least one electrically conducting member has the shape of a particle with planes which are inclined with respect to the imposed electric field.

39. (New) The system as claimed in claim 38, wherein the particle constituting the electrically conducting member has a size of $0.1 \mu\text{m}$ - 5 mm , measured in parallel to the externally imposed electric field.

40. (New) The system as claimed in claim 39, wherein the particle constituting the electrically conducting member has a size of $1.0 \mu\text{m}$ to $500 \mu\text{m}$ measured in parallel to the externally imposed electric field.

41. (New) The system as claimed in claim 38, wherein the angle λ between the inclined surface portion and the microchannel walls is 1- 80 degrees.

42. (New) The system claimed in claim 41, wherein, the angle λ between the inclined surface portion and the microchannel walls is 30 - 60 degrees.

43. (New) The system claimed in claim 34, wherein the electrically conducting member contains several layers of conducting particles, spaced both axially and longitudinally in relation to the flow direction.

44. (New) The system claimed in claim 34, wherein the electrically conducting member consists of an ionic material.

45. (New) The system claimed in claim 34, wherein the electrically conducting member consists of an electronic conducting material.

46. (New) The system claimed in claim 34, wherein the electrically conducting material consists of a hole conducting material.

47. (New) The system claimed in claim 34, wherein the electrically conducting member has a conductivity of at least 5 times the conductivity of said fluid.

48. (New) The system claimed in claim 47 wherein the electrically conducting member has a conductivity of at least 10 times the conductivity of said fluid.

49. (New) The system as claimed in claim 34, wherein the electrical connection means contains a pair of electrodes arranged upstream or downstream with respect to the microchannel segment.

50. (New) The system as claimed in claim 34, wherein the electrical connection means is adapted to provide an electrical field parallel to the direction of the transported fluid.

51. (New) The system as claimed in claim 34, wherein the electrical connection means (16) applies an alternating field.

52. (New) The system as claimed in claim 34, wherein the electrical connection means applies an alternating field which has sine, square, triangular or sawtooth shape, or a combination of said shapes.

53. (New) The system as claimed in claim 34, wherein the electrical connection means applies an alternating field where the signal has an offset resulting in a strong and a weak pulse within the signal period, and also a duty - cycle of 29%, so that the strong pulse lasts 29% of the signal period, and where the offset and duty cycle are tuned to give a zero average direct electric signal component.

54. (New) The system as claimed in claim 34, wherein the electrical connection means applies an alternating field where the signal has an overloaded direct component.

55. (New) The system as claimed in claim 34, wherein the electrical connection means applies an alternating field where the electric signal is applied in the potentiostatic regime.

56. (New) The system as claimed in claim 34, wherein the electrical connection means applies an alternating field with a maximum amplitude in V/mm equal to or larger than an amplitude for which the base -10- logarithm is the linear interval between -2 and 2, for corresponding a_{char} , measured in μm , for which the base -10- logarithm is in the linear interval between 0 and 3.7.

57. (New) The system as claimed in claim 34, wherein the electrical connection means applies an alternating field with a signal period in seconds equal to or larger than a period for which the base -10 - logarithm is in the linear interval between -6 and zero, for corresponding a_{char} , measured in μm , for which the base -10 - logarithm is in the linear interval between 0 and 3.

58. (New) The system as claimed in claim 34, wherein the electrical connection means applies a direct electric field.

59. (New) The system as claimed in claim 34, wherein the distance between each electrical connection means and the electrically conducting member is between 0.1 and 5 mm.

60. (New) The system as claimed in claim 34, wherein the electrical connection means contains four electrodes, a first pair of electrodes for inducing the SCR, and a second pair of electrodes for setting ions in the fluid in motion.

61. (New) The system as claimed in claim 60, wherein a first pair of electrodes is arranged upstream or downstream of said segment of the microchannel, anywhere in the

microchannel or microfluidic system, and wherein the second pair of electrodes is positioned on each side of said segment.

62. (New) The system as claimed in claim 60, wherein the first pair of electrodes and the second pair of electrodes each applies an alternating electric field, where the two electric fields are out of phase.

63. (New) The system as claimed in claim 34, wherein the electrically conducting member is a portion of the microchannel wall effecting a deflection of the local electrical field so that the field is inclined with respect to the electrically conducting member.

64. (New) The system as claimed in claim 32, arranged to act as a micropump.

65. (New) The system as claimed in claim 32, arranged to act as a mixer.

66. (New) The system as claimed in claim 32, arranged to provide drug delivery.

67. (New) The system as claimed in claim 64, wherein the system is part of a lab-on-a-chip assembly.

68. (New) The system as claimed in claim 64, arranged to provide electronics cooling.

69. (New) A method for pumping fluid in a microchannel comprising the step of applying an electric field to a conductive member in said microchannel sufficient to cause fluid in said microchannel to flow as a result of secondary electroosmosis.

70. (New) The method as claimed in claim 69, wherein said electric field is an asymmetric alternating field.

71. (New) The method as claimed in claim 70, wherein, with one polarity, said electric field is insufficient to cause fluid to flow as a result of secondary electroosmosis.

72. (New) The method as claimed in claim 71, wherein a time integral of said electric field is zero.

73. (New) A method for pumping fluid in a microchannel wherein said microchannel is in a microfluidic system as claimed in claim 32.